"Earthenware Houses."

1894.

INDEX.

OFFICE OF
CHARLES CARROLL GILMAN,
PATENTEE OF
Terra Cotta Lumber, Fibrous Brickware,
Earthenware Houses,
AND OTHER
MODERN HOUSE-BUILDING INVENTIONS,
ELDORA, IOWA.

OPEN LETTER TO AMERICAN ARCHITECTS.

GENTLEMEN: It was my privilege to introduce to your attention and practice some twelve years ago "*Terra Cotta Lumber*," the porous brickstuffs now so extensively used as fillings for iron frames.

I now come again to you on a similar errand, through the medium offered by this little pamphlet, the inventions being in the same lines as the first, but designed for humbler employment.

"Terra Cotta Lumber" had its mental origin for widely different purposes than fire-proofing, but in patenting was diverted from use first intended, under the belief that in another garb its field of usefulness was wider and that the world was waiting to welcome its adoption as a substitute for timber products in housebuilding, a theory which reduced to practice, failed to materialize, from the simple reason that the ware was suited only for subcoverings. Frames and joinery had to be of other material, and unfortunately for the contemplated *fire-proof* construction, these were compelled to be of none other than the very pine lumber, the invention was intended to have stricken out of the market.

As luck would have it, however, modern "Office Building" architecture had just started on its mission, and the brickstuff which had cost a small fortune and no end of labor to develop to even that degree of capacity, drifted by sheer gravity, imparted by recognized superiority, over to the subordinate position of masonry fire-proofing for the protection of metallic framing it now so satisfactorily occupies Since then, always busy in its promotion, the hope never forsook me, that time would make good original calculations, when some three or four years since accident (as I then thought it), steered me against a simple treatment of wood that rendered it impregnable to ignition.

The importance of the discovery was instantly recognized, and resigning active business management of affairs then in hand to the care of those first offering, I sought the needed retirement in my western home to again enter upon a work of original investigation.

Experiment soon disclosed the superiority of "chemicalized" wood, over iron for frames, and marble for joinery, in thorough fire-proofing practice. Inasmuch as it was now proof against the *incendiary nail* which heretofore, under tests given, would ignite the pine into which it was driven by a mere exposure of its head, the safe attachment of thin brickware covering was made possible by nailing to the treated frame.

Roofs, floors, partitions and walls were accordingly thus made, the uniform brick appearance of the structure reminding me of a jug. And if a jug, why not apply a jug finish? But my experience as a clay-worker taught the impossibility. The idea, however, was father to another more practicable. Why not stone facings? And if of stone, why not artificial stone? Called upon to give me lightly burned porous stuff, which should not weigh over sixty pounds to the cubic foot, my clay-worker afforded a ware of that weight and bulk which would absorb and hold twenty-four pounds of water that could be eliminated only by evaporation; and when the brickwares were faced with hydraulic mortars; only through their resultant stone faces.

In other words, the hydration necessary for their conversion to Beton or rock had been thus provided; and the making of artificial stone is no longer confined to contact with wet ground and to the exclusion of atmospheric influences.

An elementary knowledge of chemistry, furnished a cheap water-proofing wash for the stone faces, and the fireproofed dwelling house was finished; a substantial, attractive structure, but "jug-like" still in its indestructibility and impenetrability to extremes of temperature. Hence the name "Earthenware Houses." The construction will not burn, nor can it be made to burn by fires due to originate on dwelling house premises, whether accidental or incendiary; and such tests as may be deemed necessary by you to substantiate the correctness of this assertion, I invite.

This is a simple story, simply told, and to your unimaginative minds will undoubtedly bear the ear-mark of exaggeration; but it is true nevertheless, and Patent Office revelations show it (piecemeal) to have been strongly hinted at, before my day. See pages 5, 6 and 7.

The accompanying report of Messrs. Josselyn & Breckenridge will afford you the technique with which you are familiar. If necessary detail has been inadvertently omitted therefrom, I shall be pleased to supply it.

Reflection after its reading will remind you that the main invention, made up of, and underlying all described, is really that of "environment." The abillty to sequester an incipient fire to a single apartment by simply closing the door, for the door cannot ignite any more than the wall.

Or if the whole contents of a house be on fire, of confining the combustion from contact with other houses. "Environment" as a means to fight fire, is surely worth a place beside of incombustibility and extinguishment.

The wood-treating process properly belongs to the contracting builder, that thoroughness of performance may be assured to his satisfaction; still the manufacturer will do it if desired. A plant costs from $250 to $1,000, depending upon the capacity demanded.

Licensed clay-workers can supply the brick-stuffs under my orders, which may be profitably transported long distance, because of their exceeding lightness of weight and low classification as freight.

The rock manufacture must be *taught* by expert supervision, and the rule applies to the erection of the first structure in each builder's practice as well. Such skilled men can be had upon application.

After the coming month of May I shall be able to supply from this point in a limited way orders for ready-made structures of stereotyped plan for mountain and seaside cottages, cheap depot-buildings for railways, tenements for manufacturing and mining operatives, etc.; for the construction may be made extremely portable when designed for localities where abundance of sand water and cheap labor is native; and even before that time will arrange for delivery of the same at places much further east; notice of which will be given you in due time.

This plebian employment of the new construction by no means, should be allowed to militate in your opinion against its usefulness for costly interiors. In them it will never be recognized until the cry of fire resounds, if the stone-faced floor be carpeted.

Believe me, gentlemen, to be

Very truly yours,

CHARLES CARROLL GILMAN.

Observations of Capt. Shaw, Chief of London Fire Brigade.

PAGE 289 "HALDANE," 1890.

"To construct a building in such a way that it will resist the effects of heat and flame for any considerable time, requires considerable forethought in the choice of the position, a sound knowledge of the several materials to be used, and a skillful design to bring these materials into combination in such a way as to meet the proposed requirements of the structure when completed. Of all building materials there is none which requires more extreme care and delicate treatment than iron. Imagine a straight iron rod supported only at the ends and capable, at the ordinary temperature of the atmosphere, of carrying a heavy weight in the middle. Let a strong fire be lighted under it; in a few moments the rod will lose its straightness, first sagging in the middle, then dropping altogether, next fusing and finally running away; yet this is a material which many persons persist in calling fireproof, and put to carry heavy loads in buildings which they designate by the same improper epithet. The employment of these materials cannot be prohibited, therefore the greater reason exists for exposing their weakness in respect of withstanding fire, and pointing out necessary precautions in their use. Whenever iron is used it should be protected by terra cotta, good brickwork, sound plastering, or if nothing better can be found for the purpose, solid woodwork around it. Woodwork, if really sound and solid, will resist for almost any length of time every possible effect of heat short of actual flames; even when flames have reached it, it is by no means destroyed at once, but on the contrary, is sometimes found to last for hours; and wood protected on its underside by proper plastering, which will not fall down or crack on the application of heat, seems to be a most powerful resister of flame."

Quotation from Henry Reid's "Practical Treatise on Natural and Artificial Concrete."

PAGE 258, LONDON, 1879. "Lascelles System of Construction."

"The principle upon which this system of building is based consists in the combination of timber and concrete. In fact, interweaving, as it were, the best and most ingenious efforts of the carpenter and joiner with the no less valuable handiwork of the concrete maker. The slabs used in covering the wooden framework are made from Portland cement and small coke, being faced with cement of any desired color. True and unchangeable form and color are secured by the use of Portland cement of the best quality, colored with metallic oxides—terra cotta and colored brick being usually liable to deterioration from frost and atmospheric chemical destructants, in consequence of the impossibility of securing through the ordinary fire treatment perfectly true and enduring forms. The merits of this building commended themselves to the Paris Jurors (Paris Exposition, 1878), who were called upon to adjudicate on its architectural and structural qualities, and they awarded to Mr. Lascelles a gold medal. In addition to such high recognition he was further awarded by having conferred upon him the honorable distinction of a chevalier of the Legion of Honor. The latter distinguishing mark was the more remarkable owing to the small number selected for such honor."

"Britton's Dry Rot in Timber."

LONDON, 1875, PAGES 119 and 120.

"While upon the subject of uninflammable wood I may state that in 1848, upon Putney Heath (near London), on the roadside stood an obelisk to record the success of a discovery made in the last century by the means of building a house which no ordinary application of ignited combustibles could be made to consume. The obelisk was erected in 1786. The inventor was Mr. Daniel Hartley, to whom the House of Commons voted 2,500£ to defray the expense of the building; it stood about one hundred yards from the obelisk. The building was three stories high and had two rooms on a floor. In 1774 King George the third, and Queen Charlotte took their breakfast in one of the rooms, while in the apartment beneath, fires were ignited to attest that the rooms above were fireproof. Hartleys secret lay in the floor being double and there being interposed between the two boards sheets of iron or copper, not thicker than stout paper, which rendered the floor airtight, and thereby intercepted the ascent of the heated air, so that although the inferior boards were charred, the metal prevented the combustion taking place in the upper floor. Six experiments were made by Mr. Hartley in this house in 1776, but we cannot ascertain any particulars about them or any advantages which accrued to the public from the invention, although the court of Common Council awarded him the freedom of the City of London for his successful experiments."

REPORT.

OFFICE OF JOSSELYN & TAYLOR, ARCHITECTS,
Cedar Rapids, Iowa, Dec. 15th, 1892.

ALFRED P. BOLLER, ESQ.,
71 Broadway, New York City.

DEAR SIR: In response to an invitation extended by Mr. Gilman, I visited him at his home in Eldora, on the 17th ult., for the purpose of examining his late inventions in the line of incombustible house-building, and met there Mr. W. L. Breckenridge, assistant chief engineer of the Chicago, Burlington and Quincy Railroad, and superintendent of its Iowa lines, bent upon the same errand, whose acquaintance I was glad to make, and who will join me in this report, made because of your written request for it to Mr. G., and would have been made before could the photographs taken at the time, and now accompanying, been obtainable.

Our visit was short and hurried (five hours time only between the arrival and departure of trains), but the business in hand was on the direct line of our professional practice, the facilities afforded for examination excellent, and the usual preliminaries to such work waived, conditions which enabled us to accomplish, to our satisfaction, a great deal of work in a very short time.

Mr. Gilman's invention we found to be both of material and construction; in fact the employment of these materials enable building practices not to be had by those in common use.

The first of which the inventor designates as "incombustive wood" and "fibrous brickware." The second, as "earthenware houses." "Beton wall facings," "water-proofed cellars," and others are as yet unready for presentation to the public, as the manufacture of materials and, conseqent construction based upon their use, had ceased at the time of our arrival because of the lateness of the season. We have taxed Mr. Gilman for much information regarding each, that our report may be full and comprehensive.

His formulae for the production of the materials, explanation of the functions performed by each, and interpretation of the phenomena exhibited under their trial by fire, we will to begin with, undertake to quote in his own words as near as may be as properly preceding, and likely to add interest to our descriptions following.

INCOMBUSTIVE VS. INCOMBUSTIBLE.

"As properly descriptive of my new construction I employ the coined word *incombustive* in preference to incombustible (not capable of being burned), inasmuch as under some possible conditions capable of being afforded, such a quality exists in no matter at present known to man, nor is such needed for what is erroneously termed fire-prooting.

"*Difficult to inflame, ignite or burn under exposure to heat and flame*, is the definition I would attach to this word, and these properties I claim belong to my new material, which, when erected in such form as to obstruct further progress of fire, may fairly be applied to the construction as well.

"I claim for the invention even more, for the exhibit to be made to you to-day will be an endeavor to prove to your satisfaction that a dwelling built of them *cannot be made to burn* from contact with combustion of contents usual to dwellings, and that such house building is as simple as, and costs no more than the ordinary combustive construction of the present age."

INCOMBUSTIVE WOOD.

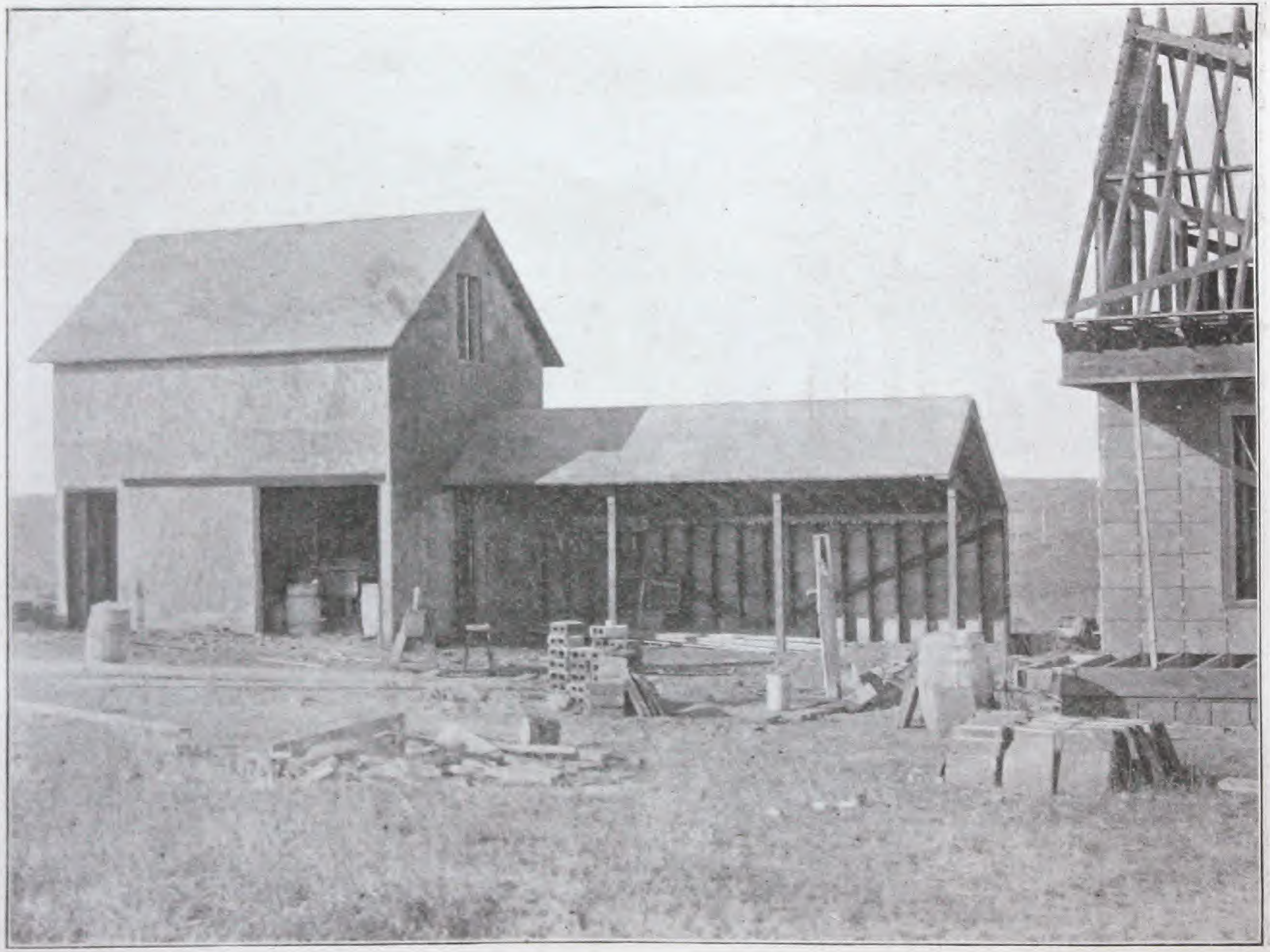
"My treatment of wood to render it incombustive consists of first soaking it in chemical solutions and then evaporating the water, the salt regaining a crystaline form may then be found dispersed throughout those portions of the wood reached by the solution, in particles as fine as flour. Attacked by heat, equal to that given by a candle flame, these volatilize, a portion of the gases penetrating deeper into the wood, but far the greater volume escaping outside to aggressively combat flames and combustion even to extinguishment; a result which I attribute to the fact that the gases are hydrochlorine and because heavier than the atmosphere, and extinguishing, by superior gravity excludes the latter (its oxygen) from the fire and suffocates it.

"Sixty hours of such impregnation thus enables a resistance that cannot be overcome by any degree of heat thus far attempted, to an extent

No. 1.

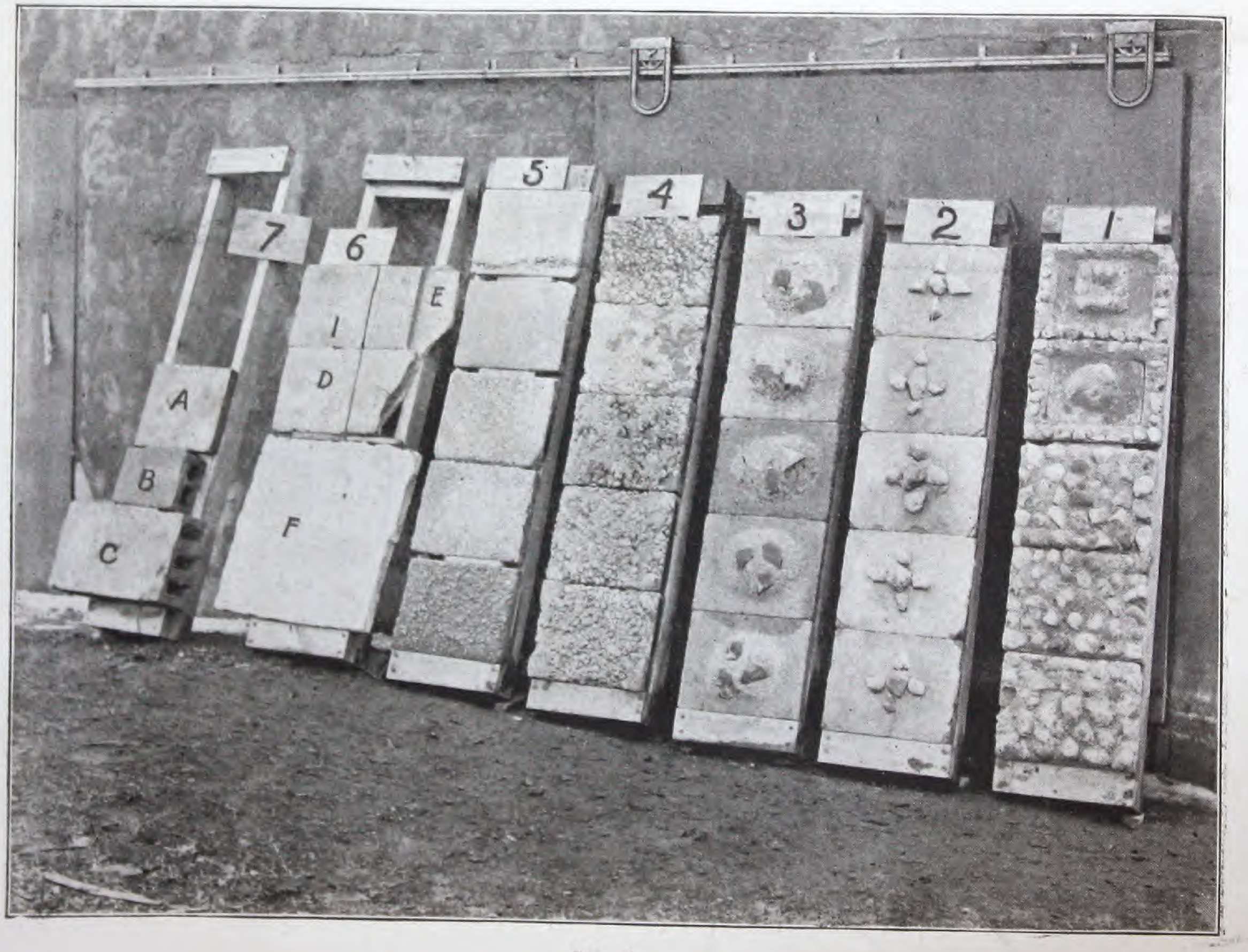
No. 2.

No. 3.

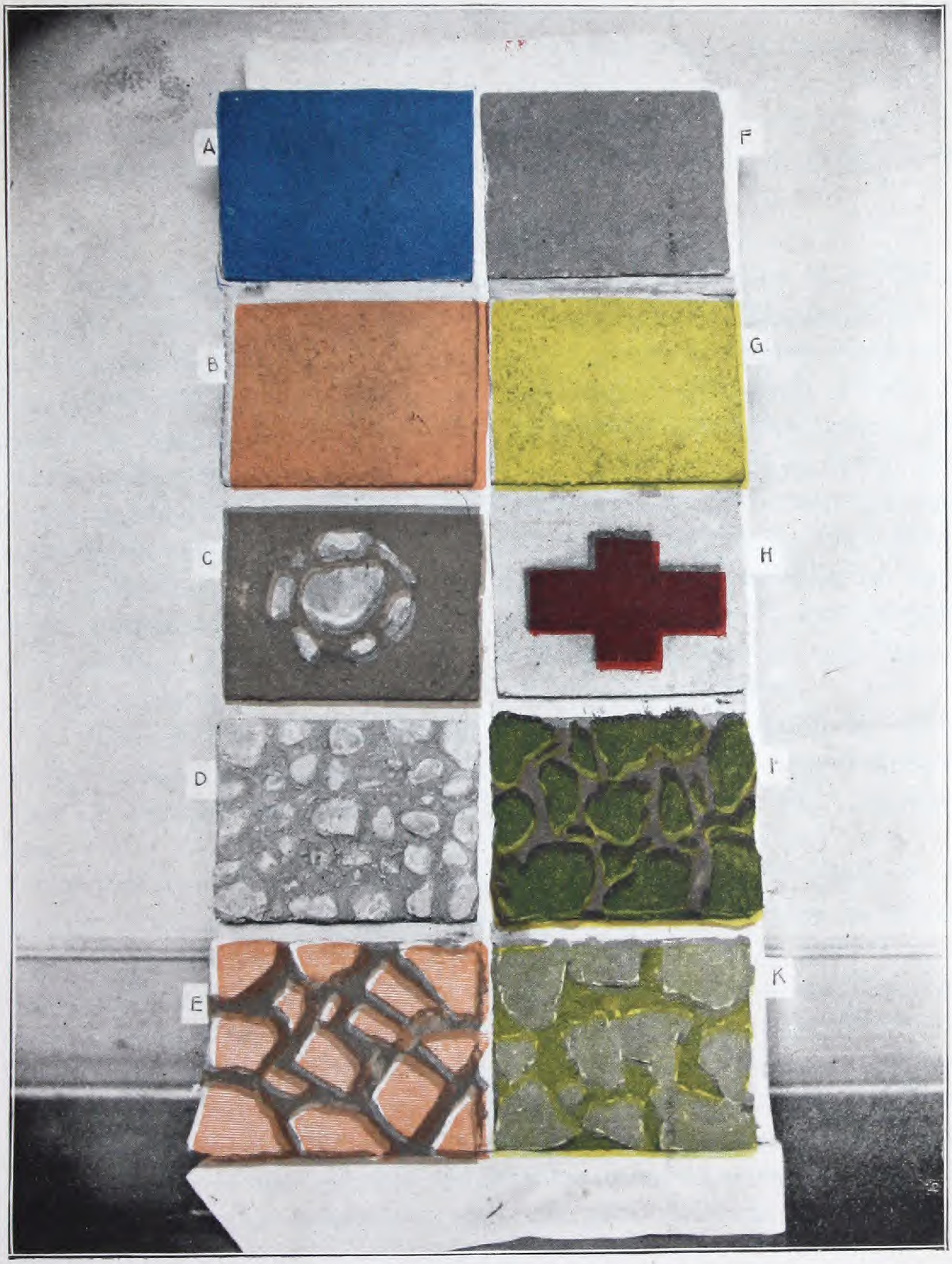


No. 3 "A."

No. 3 "B."



No. 4.



No. 5.

that will compel treated wood to flame or incandesce in its slow carbonization. The treatment costs in its application from seven to twenty dollars per thousand feet board measure. The salts employed are anhydrous and will not deliquesce in damp atmospheres, nor is the deposition in the timber sufficiently dense to exclude air or threaten its longevity by dry rot; in fact they are an important constituent in wood preserving preparations.

FIBROUS BRICKWARES

"Is the latest and best of my six patented inventions of "Porous Earthenware," "Terra Cotta Lumber" being the first. The formulae for its manufacture differs so far from the others, as to employ black soils largely with clays, too fat for brickmaking, and commingling asbestos in greater or less quantities with the vegetable matter, that enters the plastic composition, which indestructible by the subsequent firing processes, remains in the burned wares as a fibre to bind them as jute does 'Staff;' for great porosity is only had by excessive adulteration of the clays, with combustible matter. Thus is enabled the production of sheet stuffs, from one-half to an inch and a half in thickness, that will not warp in the after-processes of drying and burning, or shrink or expand under any conditions of heat, cold, or moisture, subsequent thereto.

"The making is simple, and within the art exercised by every farmer's drain-tile manufacturer, and the cost per cubic foot not greater than of common building brick, though the weight is fifty per cent. less.

"The wares I have to show you to-day are of this sort, but have no fibre in them, and in consequence are somewhat fragile. They have been piled in my back yard for the past three years to enable an opinion as to their ability to withstand exposure to rain, frosts and sun, and the effect such experiment might have on their weathering qualities; in fact it was in pursuance of this experiment which led up to the 'fibrous' invention. After personal examintion of these materials is had to your satisfaction, I will submit their construction, in buildings Nos. 1, 2 and 3; though because of the inferior proportions of my apparatus, which was calculated for experimentation only, the pine in them has not been treated."

Accompanying Mr. Gilman to his workshop and storage yards, we were shown piles of brickwares of various forms; large hollow blocks for

cellar walls and foundations; smaller ones and oblong, for walling wells; and sheets of varying sizes, but principally one and one-half inches in thickness, twelve inches wide by sixteen in length, and as straight as so many pieces of pine plank. With a common hand-saw these cut far quicker than soft woods of same thickness, and the vigorous slash of a jack-knife scored a stroke an inch deep, the whole length of a sheet, an apparent lack of texture that hardly seemed compatible with the after-uses that might be demanded of them, an opinion which Mr. G. reconciled by explaining that they served first merely as matrices for stone mortars, which had great anchorage in them, and subsequently being converted to beton, enabled all necessary strength; the former then becoming non-conductive and indestructible linings.

The chemical treatment of pine was given in a shallow evaporating pan of iron, placed on low brick walls, under which (and on the ground) was maintained a slow fire adequate only to maintain its liquid contents barely to a boiling point. In the solution of chemicals therein were placed pieces of dry pine dimension, short boards, etc., and kept submerged with weights.

Taking with us to the house a few dried samples which had received sixty hours of such treatment; pieces of inch pine, three inches by eight, we placed them side by side flatwise, on the open parlor grate, in which a red-hot anthracite fire was burning briskly, we meanwhile watching the result with much interest.

Twenty minutes of this exposure developed no flame or appearance of burning, beyond a perceptible shrinkage of proportions, but the pieces when removed to the hearth one by one, showed their underside carbonized to about one-half their original thickness, the charcoal residue remaining firmly attached, and the upper faces of the blocks appearing intact, not even scorched. Upon removal from the grate the charred surfaces appeared red and inflamed, but the color abated immediately when detached completely from contact with the coal. Smaller pieces, the size of one's finger, submitted to the same provocation, carbonized throughout in fifteen minutes' time, the charcoal (somewhat shrunken) retaining the original form of the wood, and handled with bare hands caused no discomfort. We could not but consider this trial an extraordinary one, though in the absence of further tests, we are not certain but what the hard coal gases effected the combustion.

After dinner we strolled to another part of town not far away, to examine the new buildings spoken of; a photographer was on the spot, and the views which he took at intervals, as well as those taken during construction, we shall report as Nos. 1, 2 and 3, etc., in further description, and enclose to you with this report.

Our first visit was made to premises No. 3, a modern story-and-a-half cottage and outbuildings, as shown; the open barn door and interior of shed revealing the construction common to all of the buildings, to-wit: pine frames sheathed with one and one-half inch wares, which in turn are faced with a superficial coating of hydraulic cement mortar. Pictures 3a and 3b, taken at an earlier stage of construction, afford a still better idea of the framing, and method of sheet application.

The framework is thirty-three per cent heavier than given to ordinary pine construction, and a heavy twelve-inch by twelve sill mounted on cellar walls, of stone faced brickstuffs, eight by twelve by twenty-four inches laid flatwise support the structure as a whole. All wooden trimmings, save of openings, have rough surfaces as they came from the saw, and are stained the color of old wood, a projection of the sill affording the water-table.

BETON WALL-FACINGS.

A further inspection of photo view of Premises 3, and of 3b as well, discloses an effort at decoration on the lower story of each end of the cottage; while in No. 3 further work of this sort, but of somewhat different character is discernable above and below the bay windows, though the showing is so dim that Photos Nos. 4 and 5 must be introduced to enable a lucid description, for it may be seen at a glance that here is exposed an ornamental treatment of the wares before they have been nailed to place.

Owing to the inability of the camera to reproduce colors other than of light and shade, the photos do not do this subject justice, though some idea of the charming blending of colors is conveyed by the red stone coatings of roofs and porch floors, brown walls and trimmings of gray.

Frame 1, of Photo 4, shows field-stone on colored rock background; Frame 2, the same on gray; Frame 3, rock-center on brick-field, as shown on 3b, subsequently finished up with stone mortars on wall, as shown on Photo 3; Frame 4, samples of "rough-casting" in various tints; Frame 5, "sized," gravel-ware, that is to say, gravel screened to uniform degrees of fineness.

Beneath the application of this work lies an art, which Mr. Gilman declines to describe at present, but gives assurance that the variety of decoration, attended by skillful combination of form and color, may be said to be almost endless, and that the treatment is durable, but requires thirty days to perfect (conversion to stone) before it may profitably be erected to place.

Roof, exterior walls, and floors out of doors (porches) and in, are sheathed with the wares by nailing them to frame centers. A single twenty penny steel nail, surmounted with a disk or washer the size of a silver dollar supporting the corner of the slabs to place in most instances, though of course without accompaniment of disk the nails may be driven directly through them. One volume of Portland cement to four of sand is the rule for mortar mixtures, though the adulteration may be profitably had in greater degree for floors and roofs ; from one-fourth to half an inch in thickness for vertical walls, and an inch or more for horizontal.

The mortars are made exceedingly plastic and applied with "float" and plasterer's trowel, indeed they are inclined to set so rapidly that it is inexpedient to resort to slower finishing methods, unless it be with the "darby," which is employed to *roughen* the surfaces and not smooth them as is common practice; a treatment which combined with varied colors imparted to the mortars, by admixture of various mineral ochres, affords a very charming finish, as may be discerned by close examination of the photos accompanying, but better shown in No. 2. Interior walls are treated with the usual quicklime plastering, but at the time of our visit were in an unfinished condition, left so purposely the better to enable examination.

WELLS AND CISTERNS.

Premises No. 3 boasts of a well and cistern built of the wares ; or to state it more precisely, the well is walled with them, and the cistern lined. The wall blocks being stone-faced before adjustment, the sheathing of the latter being cemented after, thus creating stone linings for the bottom and battered walls of the excavation made to receive them.

"A" on Frame 7, of Photo 4, is such a sheet ; "b," a well-block, and "c," a block used for cellar and foundation walls, laid flat or edgewise, as demanded by the weight of the superstructure which the wall is calculated to support.

The cost of the well complete, as given by Mr. Gilman's books, is $54.00, and of the ninety-barrel cisterns $35.00. The total cost thus shown of remaining premises (No. 3) is $1,883.21, which equals say $1.25 per square foot of area for cottage, $1.00 per square foot for barn and 50 cents for shed, by no means a high price in Iowa for pine construction of the same class.

An interesting fact is divulged in the sub-division of cost, on books, which approximately average one-third each for labor, brickwares and for materials of foreign make, *i. e.*, glass, nails, lumber, hardware, paints, etc., and decidedly suggestive to western towns hunting for manufacturing establishments, if it be true that the third of building cost, customarily sent away for purchase of material can be kept at home; and this is about what it seems to amount to.

"WATER-PROOFED CELLARS"

Is another of Mr. G.'s inventions, worthy of detailed mention. Photo view No. 2 is the perspective of a workingman's home, 16 x 24 feet area, and two and a half stories high, the first story designed to do duty as a cellar, being placed fully beneath the surface of the ground.

Its construction began by excavating the earth to the even depth of six feet below the surface, the area being made larger on all sides by two feet than needed for the building to occupy to enable the men to work handily on outside of frame.

On the leveled ground bottom was laid a superficial floor of one and a half inch brickware sheets, and the house-sills bedded into an inch coating of hydraulic cement mortars, placed in position underneath, which in a few days becomes of sufficient hardness to allow the cementation of the remainder of the floor and the erection of the frame on the sills thus bedded.

The extra space allowed about the frame enables the workmen to fit the sheets therein, making tight-fitting joints with the cemented floor beneath to which it is subsequently attached by the cement mortar coverings. When sheathed and cemented to the ground level, dirt is filled back and solidly tamped in. If insisted upon inside walls may be thus sheathed and plastered, but in ordinary cases is not needed to insure completely insulation against dampness and cold.

This house was finished ready for occupancy by three men in three weeks from the time the first shovel full of dirt was moved, though some

of the interior plastering was done afterward. Its total cost, shown by the books, figures up $445.60, of which $324.68 were disbursed for material, and $120.92 for labor.

The latter item is embodied as follows:

Carpenter (eight days)	$18 31
Mason and Plasterer (ten days)	42.44
Handymen and Laborers (thirty-three days)	50.42
Teaming	9.75
	$120.92

Emphatically a handyman's job.

Average cost, $1.18 per square foot of area.

Our attention was next called to building reprcsented by Photo 1, a building twenty feet square and of same height, and placed on a cellar wall built of hollow earthenware blocks.

The house was built three years since and is a pine frame enclosed outside and in, with the brickstuff, stone-faced and plastered. Its erection was experimental to test strength of floors and the effect of Iowa's climate of extremes upon weather coverings, which now, to all appearances, are solid rock though small cracks are seen in places, evidently caused by the contraction of the cement, in spaces between sheets, not carefully enough closed in laying the latter.

To change the second floor into an office-room the present season it was found necessary to remove the floor above, a work performed with sledge and crowbar, for the stone covering could not be detached from the brick, which compelled its breaking up as a whole. Photo View 4 presents the stone face of a section thereof marked "F" in Frame 6, and "D" shows the under brick sheet, "E" being a projection of the stone coating. An idea of the apparent strength of the floor may be thus fairly conveyed.

EXTINGUISHING GASES.

Our next and last experiment was to test the correctness of Mr. Gilman's theory relative to the extinguishing properties of the gases evolved from his "chemicalized" timber, under the provocation engendered by a pine wood fire, built in the fire-proof basement of House No. 1.

Two fires of pine, located six feet apart from each other on the cemented floor were built and when briskly burning three or four pounds

of treated wood were placed on top of each. Foggy sort of gases began to pour forth at once in rapidly increasing volumes, and we retreated up the stairway, closing tightly the trap-door behind us, the only opening to the room except a half-window in each end—closed, of course, for the experiment. Once outside, we stationed ourselves at these and watched the progress of the fires inside. At the expiration of three minutes smoke and gases were forced outward through crevices between sills and foundation, and the closest inspection through the windows failed to discover any fire or lights of fire in the room. In two minutes after, the windows and trap-door were thrown wide open to expel the prodigious quantity of gases evolved, but it was fully three minutes longer time before we could enter, and then found, to our surprise, the fires blazing without apparent hindrance, the treated sticks laying on top as first placed charred to half their depth, but not burning.

The time left for further investigation was too short, nor could we see the way clear to make any other test than repeat the first one, which would only have found us in precisely the same predicament we were then placed; a state of indecision as to whether the fires really did go so low as to become undistinguishable and were again fanned into life by the timely admittance of fresh air? or whether, because of the density of the gases, with which the room was crowded, hindered us from seeing the flames.

We would like to witness further experiments under more favorable conditions for examination before passing judgment, for if it be true that the gases are extinguishing and act aggressively in putting out the fire which creates them, thus affording an active resistance as well as passive, *too much emphasis cannot be placed upon the fact.*

CONCLUSION.

What we have seen, even if not so convincingly presented to you, leads us to the following conclusions, to-wit:

First. That the new architecture thus examined and described, supplies a long-felt want to builders, and while it can be made to closely follow the usual lines of wooden framing, is strongly suggestive of a new field in house-building which, developed by skillful hands, will yield a usefulness, novelty and beauty exclusively its own.

Second. That houses 1, 2 and 3 (if their floors extend as fire-stops between stories, from outside wall to outside, a fact we did not ascertain,)

afford better protection from fire originating outside or in, than any dwelling house construction of the day; but if in addition, all woodwork be made as incombustible as displayed to us, assurance would practicably be made doubly sure.

Third. That the brickwares first serving as matrices and foundations for mortars, secondarily become non-conductive linings for the stone faces, into which the mortars are converted by chemical action, thus rendering interiors easy to maintain at given temperature, at a saving of fuel over ordinary practices.

Fourth. That at Iowa prices for framing timber, to-wit: $18.00 per thousand B. M., and pine sheathing and finishing stuffs at proportionate prices, the first cost of such buildings would as demonstrated to us be substantially as cheap as those of same class erected wholly of wood or jointly of wood and bricks.

Fifth. That this construction can be made to profitably include largely business structures of towns where elevator service to upper stories may not be made to pay.

Sixth. That even under as severe conditions as were imposed in our trial of treated wood, we are willing to allow the inventor all he claims for its incombustibility, but that additional experiment is greatly to be desired of the extinguishing powers of the gases, as we have before suggested.

All of which is very respectfully submitted.

BURLINGTON, Iowa. (Signed) H. S. JOSSELYN.

(Approved) W. L. BRECKENRIDGE.


EARTHENWARE HOUSES.

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